

NO FURTHER ACCELERATED ACTION JUSTIFICATION FOR ASH PITS

PAC REFERENCE NUMBER(s) SW-133 1, 133 2, 133 4, and 1702

IHSS Reference Numbers SW-133 1, SW-133 2, SW-133 4, and PAC SW-1702

Unit Name Ash Pits

Approximate Location N748,000, E2,080,000

Date(s) of Operation or Occurrence

1950s - 1968

Description of Operation or Occurrence

In 1970, four burial sites (trenches [SW-133 1, SW-133 2, SW-133 3, and SW-133 4]) were located south of the incinerator area (IHSS 133 5). These trenches were used for disposal of ash (and noncombustible trash) from the incinerator that operated from approximately 1952 until 1968. Noncombustible trash, such as counting discs, broken glassware, and metal, was collected in a nearby dumpster and later disposed of in the trenches. The trenches are approximately 150 to 200 feet long, 12 feet wide, and 10 feet deep, and have been staked with steel fence posts and surveyed. Approximately 3 feet of soil covers each trench location. Two additional burial trenches (PAC SW-1701 and SW-1702) were identified in 1994 (DOE 1996) based on anomalies found during a time-domain electromagnetic (TDEM) conductivity survey. These two additional areas were confirmed through review of aerial photographs and samples collected from boreholes in the immediate area (Figure 1).

Ash from the incinerator and "dump area" was monitored in 1959 (DOE 1992). Activities of 4,000 counts per minute (cpm) alpha and 30 millirems per hour (mr/hr) beta were observed. Subsequently, the ash was buried in a trench. Special air sampling of the Plant incinerator was conducted in 1958 to address concerns of burning potentially contaminated waste from Buildings 444 and 447.

Physical/Chemical Description of Constituents Released

In September 1954, five ash samples from the burning of Building 991 wastes were collected. The average activity of the ash was 4.5×10^7 disintegrations per minute per kilogram (dpm/kg) of dry ash. The alpha activity of the ash was approximately 100 times higher than the usual ash samples from the incinerator.

In 1956, special monitoring was performed during and after contaminated waste was burned in the Plant incinerator. Ash samples indicated 1.9 grams of radioactive material (depleted uranium) per kilogram of ash. Smear surveys of the incinerator before and after



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burning showed no increase in contamination. It was estimated that approximately 30,000 cubic feet of soil and ash were buried in the trenches.

Small quantities of depleted uranium-contaminated combustibles were burned along with the general combustible Plant refuse. One estimate indicates that less than 100 grams of depleted uranium were in the combustibles. A monthly ash sampling program was initiated in January 1962 and indicated there was 1 to 8 kilograms of depleted uranium per ton of ash (DOE 1992).

Responses to Operation or Occurrence

Sampling events were conducted from November 24, 1953, through December 9, 1954. In 1970, the locations of Ash Pits 1-1 through 1-4 were marked in the field. The ash in these trenches was evaluated and considered to present no problems unless disturbed and inhaled.

Fate of Constituents Released to Environment

The 2001 Annual Update for the Historical Release Report provides an NFA determination assessment for all of the Ash Pits. Based on the data and assessment provided in that update, NFAs were approved by the regulatory agencies for Ash Pit 3 (SW-133 3) and the Recently Identified Ash Pit (TDEM-1) [SW-1701] (EPA, CDPHE, 2002). The regulatory agencies determined that additional data needed to be collected to render a NFA determination for the Incinerator Facility (SW-133 5) and the Concrete Wash Pad (SW-133 6).

Because of proposed modifications to RFCA Attachment 5, specifically, the introduction of new Action Levels (ALs) and the integrated risk-based approach (application of the Soil Risk Screen), Ash Pit 1 (SW-133 1), Ash Pit 2 (SW-133 2), Ash Pit 4 (SW-133 4), and the Recently Identified Ash Pit (TDEM-2) [SW-1702] have been reassessed to render a No Further Accelerated Action (NFAA) determination. The data utilized in this assessment are the same as provided in the 2001 Annual Update for these PACs.

The ash pit sites and surrounding area were extensively sampled as part of the Final OU 5 RFI/RI (DOE 1996) and through groundwater and surface water monitoring. The locations of boreholes, wells, surface soil samples, sediment samples, and surface water samples used in this evaluation are shown on Figure 1. Data presented in this narrative are comprehensive, up-to-date information, retrievable from RFETS database archives. RFCA Action levels (ALs) are from the proposed modifications to RFCA Attachment 5, dated November 12, 2002 (DOE, 2002). Background levels for subsurface soil are from the Background Geochemical Characterization Report (DOE 1993). Background values for surface soils and sediments are from Geochemical Characterization of Background Surface Soils Background Soils Characterization Program (DOE 1995). All background values used for comparison are the mean background value plus two standard deviations. Table 1 lists the trenches and associated boreholes and/or wells.

Analysis of 18 surface soil samples from across the ash pit area did not indicate metals are present above the ALs, and with the exception of one sediment sample where arsenic is 17.3 mg/kg (bkg - 13.1 mg/kg), they are not present above background (Table 6).

In addition to laboratory analysis for radionuclides, a High Purity Germanium (HPGe) survey of the entire area was conducted in 1993. Figures 2, 3 and 4 show the survey results for americium-241, uranium-235, and uranium-238. Americium was not detected at statistically significant levels. This result suggests the absence of plutonium. Concentrations of the uranium isotopes were all well below the ALs. Consequently, the excavation of surface soil is not required.

APPLICATION OF THE SOIL RISK SCREEN

Screen 1 – Are COC Concentrations Below Table 3 Soil Action Levels for the Wildlife Refuge Worker?

No. As shown in Tables 2 through 5, the maximum concentrations of uranium isotopes and a few metals in pit material buried to a depth of approximately 3 feet exceed the ALs as follows:

SW-133.1 – Uranium-235 and Uranium-238 (Table 2)

SW-133.2 – Chromium, Uranium-235 and Uranium-238 (Table 3)

SW-133.4 – Uranium-235 and Uranium-238 (Table 4)

SW-1702 - Chromium, Lead, and all of the Uranium isotopes (Table 5)

~~Analysis of 18 surface soil samples from across the ash pit area did not indicate metals are present above the ALs, and with the exception of one sediment sample where arsenic is 17.3 mg/kg (bkg — 13.1 mg/kg), they are not present above background (Table 6).~~

~~In addition to laboratory analysis for radionuclides, a High Purity Germanium (HPGe) survey of the entire area was conducted in 1993. Figures 2, 3 and 4 show the survey results for americium-241, uranium-235, and uranium-238. Americium was not detected at statistically significant levels. This result suggests the absence of plutonium. Concentrations of the uranium isotopes were all well below the ALs. These results confirm that uranium is the only radionuclide of concern in this area, and the contamination is largely confined to the material within the Ash Pits.~~

Screen 2 – Is there a potential for subsurface soil to become surface soil (landslide and erosion areas identified on Figure 1)?

Yes As shown in Figure 5, the ash pits are located in an area that was mapped as being prone to landslides

Evaluate accelerated action in accordance with Section 4 C and 5 C and consider any subsequent screens in the evaluation, as appropriate

As noted in Screen 1, the maximum concentrations of uranium isotopes and a few metals exceed the ALs at the Ash Pits. However, with the exception of PACs SW-133 2 and SW-1702, the average concentrations are well below the ALs. At SW-133 2, the average chromium concentration (429.7 mg/kg) exceeds the AL of 268 mg/kg. However, the average concentration is 1/20th of the maximum concentration indicating the maximum chromium concentration is an isolated zone of contamination not representative of the balance of the material present in the PAC. At SW-1702, the average concentration of lead (1223 mg/kg) and uranium-235 (9.7 pCi/g) exceed their respective ALs (1000 mg/kg and 8 pCi/g). However, these exceedances are relatively small, i.e., they are within 20- 25% of the ALs.

Although the Ash Pits are located in an area that has been mapped as a landslide deposit, a visual inspection of the area indicates it has a broad, gently sloping (~8% grade) surface, with no evidence of recent landslide activity. Also, the area has a well-established vegetative cover, which will minimize erosion from runoff.

Because the Ash Pits are near Woman Creek, bank erosion and eventual down-cutting into the Ash Pits is another potential mechanism to expose contaminated subsurface soil. However, the closest Ash Pit, SW-133 6 [not under evaluation here], is 80 – 100 ft from the creek. Over the past 60 years, there is no discernable bank erosion based on overlaying a relatively recent aerial photo transparency (ca. 1992) on a 1937 aerial photo with the same scale. Furthermore, the Ash Pits are outside the 100 year floodplain (Figure 6).

One final mechanism to be addressed with respect to potential exposure of subsurface contaminated soil is the action of burrowing animals. Typically, A prairie dogs can burrow to depths of approximately 6 feet and thus potentially bring contaminated subsurface soil to the surface¹. However, it must be recognized that the Ash Pits area is relatively small (~20 acres) compared to the human exposure unit sizes being considered for the comprehensive risk assessment (on the order of several hundred 500 acres). Accordingly, the incremental impact from this activity is small. Furthermore, any soil that would be brought to the surface would be mixed with uncontaminated overlying soil during the burrowing activity.

Screen 3 – Does subsurface soil contamination for radionuclides exceed criteria defined in Section 5.3 and Attachment 14?

¹ The future exposure of subsurface contamination due to burrowing animals has been addressed in the recent modifications to the RFCA Action Level Framework.

No As shown in Tables 2 through 5, plutonium and americium concentrations are well below the soil ~~Als action level of 50 and 76 pCi/g respectively~~, and therefore, further analysis is not required

Some uranium isotopes, as noted in Screen 1, exceed WRW levels, however, approximately three feet of uncontaminated to slightly contaminated soils were previously placed over the pit materials. This cover sufficiently protects the WRW from direct exposure and eliminates the need for an accelerated action.

Screen 4 – Is there an environmental pathway and sufficient quantity of COC that would cause exceedance of SWS? Is there (or will there be) a groundwater treatment system intercepting groundwater to treat COCs originating from the IHSS, AOC, or OU²

No Although a groundwater treatment system is not and will not be in place to intercept groundwater from the Ash Pits, ~~as discussed under Screen 6~~, groundwater does not appear to be a significant pathway for COC migration to surface water. Current groundwater monitoring does not indicate groundwater contamination in this area, however, the number and location of groundwater wells will be evaluated between now and Site closure.

Contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated by the Ash Pits. The erosion pathway can be eliminated because surface soil is largely uncontaminated in the vicinity of the Ash Pits (Table 6 and Figures 2 through 4), and deep erosion is unlikely as discussed in the evaluation presented after Screen 2. However, because groundwater is a possible pathway whereby Woman Creek could become contaminated by the Ash Pits, groundwater chemistry has been evaluated for evidence of contamination. Subsequently, Woman Creek surface water quality is assessed.

Downgradient Groundwater Quality

Data from wells in the vicinity of the Ash Pits were evaluated to determine whether there is an impact to groundwater. Groundwater quality data are summarized in Table 7, and are discussed with respect to each of the PACs below.

SW-133 1 (and SW-133 3) - One well, 56294, is immediately downgradient of these PACs. No contaminants were detected above RFCA Tier I ALs and only thallium was found above Tier II. Thallium is not a soil contaminant at SW-133 1 (Table 2). It is also not a contaminant at SW-133 3 (see 2001 Annual Update for the HRR).

SW-133 2 – Downgradient of this PAC, aluminum concentrations in groundwater were greater than the RFCA Tier II AL in well 58793, thallium was reported once at a concentration greater than the RFCA Tier II AL in well 63793, and uranium-233,234 and uranium-238 concentrations were greater than RFCA Tier II ALs in wells 58793, 63693, and 63793 downgradient of this PAC. Aluminum and thallium are not soil contaminants at PAC 133 2 (Table 3). Although uranium-233/234 and uranium-238 have maximum soil concentrations that are well above background, the average concentrations are more than an order of magnitude less, i.e., the significant uranium contamination in the subsurface soil is

isolated, and therefore, the PAC does not appear to be a significant source for groundwater uranium contamination

SW-133.4 and SW-1702 - The nearest downgradient well (63093) contained methylene chloride concentrations above detection limit and uranium-233/234 and uranium-238 concentrations above Tier II ALs. This well was sampled numerous times, and methylene chloride was only detected once. Additionally, methylene chloride is not present in soil at SW-133.4 or SW-1702 (Table 4 and 5). Like SW-133.2, the maximum concentrations for all three uranium isotopes are well above background in subsurface soil at PAC SW-133.4 (Table 4) and SW-1702 (Table 5), however, the average concentrations are approximately an order of magnitude less. Again, the significant uranium contamination in the subsurface soil at these PACs is isolated, and therefore, the PACs do not appear to be significant sources for groundwater uranium contamination.

The above assessment indicates that only uranium-233, 234 and uranium-238 are groundwater contaminants that may have arisen from the Ash Pits, specifically PAC SW-133.2, SW-133.4 and SW-1702. More recent data was collected for well 63093 and well 5686 directly downgradient in the Woman Creek drainage (Table 8). The new uranium data for well 63093 indicates similar uranium concentrations to that of previous data. The concentrations of these uranium isotopes further downgradient in the drainage (5686) are below Tier II ALs, which indicates attenuation (dilution, dispersion, adsorption) has reduced the concentrations to levels of no concern. Indeed, the uranium concentrations in groundwater at all locations downgradient of the Ash Pits are below the surface water standard for Woman Creek of 11 pCi/l of total uranium.

Downgradient Surface Water Quality

As shown in Table 9, aluminum, antimony, cadmium, copper, iron, lead, manganese, mercury, silver, americium-241, gross alpha, gross beta, and plutonium-239/240 concentrations in nearby surface water locations have occurred at concentrations exceeding the surface water ALs. However, the previous analysis regarding surface soil, subsurface soil, and groundwater contamination strongly suggests that uranium is the only contaminant with potential, albeit low, to migrate to surface water from the Ash Pits via groundwater. Because uranium is not a contaminant that exceeds surface water ALs in Woman Creek, the Ash Pits are not impacting surface water quality. Furthermore, water quality data at downgradient station SW027 (surface water point of evaluation [POE]) and at Pond C-2, indicate these contaminants have never been detected above RFCA surface water ALs.

Screen 5 – Are COC concentrations below the Table 3 Soil Action Levels for ecological receptors?

At this time, ecological ALs are not available for all receptors/chemical combinations however, values are available for a small subset of chemicals. Screen 5 currently evaluates only this subset and the remainder will be addressed through the ecological risk assessment portion of the Comprehensive Risk Assessment (CRA)

As shown below, maximum concentrations for beryllium and/or lead exceed the ecological ALs in all of the Ash Pits, and in several cases, the average concentrations also exceed the ALs. The highest concentrations of lead and beryllium are observed in PAC 1702 where the average concentrations exceed the ALs by approximately an order of magnitude (Table 5)

| PAC | Chemical | Max Conc. Exceeds Ecological AL | Avg Conc. Exceeds Ecological AL |
|----------|-----------|---------------------------------|---------------------------------|
| SW-133 1 | Beryllium | Yes | No |
| SW-133 1 | Lead | Yes | Yes |
| SW-133 2 | Beryllium | Yes | Yes |
| SW-133 2 | Lead | Yes | Yes |
| SW-133 4 | Beryllium | Yes | No |
| SW-133 4 | Lead | Yes | Yes |
| SW-1702 | Beryllium | Yes | Yes |
| SW-1702 | Lead | Yes | Yes |

Evaluate accelerated action in accordance with Section 4 2.CC and 5.3.IE and consider any subsequent screens in the evaluation, as appropriate

Per Section 4 2.CC of Attachment 5, DOE will consider the target species and the exposure unit for that species, and the location, areal extent, and concentration of contamination in evaluating and determining appropriate accelerated actions necessary to protect ecological resources

SW-1702 material contains average lead and beryllium concentrations that significantly exceed the ecological ALs. As a first step in evaluating the risk posed to the ecological receptors, the ecological receptor that is the basis for the AL was identified

Beryllium

The beryllium AL of 2.15 mg/kg is based on protection of the prairie dog²

Lead

The lead AL of 25.6 mg/kg is based on protection of the American Kestrel. Because the American Kestrel, a bird of prey would not be directly exposed to the buried material,

² It should be noted that the background beryllium concentration for subsurface soil is 14.2 mg/kg which exceeds the AL. In this case and in all cases where background levels exceed the AL for protection of ecological receptors, achieving background levels becomes the cleanup goal

Preliminary Remediation Goals (PRGs) for other ecological receptors were examined³. The PRGs for protection of the prairie dog and Prebles Jumping Mouse are 149 mg/kg and 642 mg/kg, respectively.

As can be seen from Tables 1 through 5, SW-1702 has significantly higher concentrations of beryllium and lead than the other Ash Pits, and the average concentrations exceed the AL/PRG for burrowing animals. The average concentration of lead in the waste is less than a factor of two higher than the prairie dog-based PRG, however, both the beryllium and lead concentrations significantly exceed the Preble's Jumping Mouse-based PRG. Although the concentrations of these COC exceed the PRGs for protection of the Jumping Mouse, the mouse typically burrows to a depth of only 15 inches, and the buried material is 3 feet below ground surface at the Ash Pits per the Historical Release Report (DOE 1992). Therefore, it is unlikely that the Jumping Mouse will be exposed to the material. Furthermore, the areal extent of SW-1702 is relatively small compared to the habitat areas on Site, and accordingly, the risk to the Jumping Mouse (and prairie dog) is also proportionately low. Lastly, SW-1702 is in a Preble's Mouse habitat, and it is uncertain that removal of the buried material and disruption of the habitat would result in a net benefit to the Jumping Mouse.

~~Screen 6— Is there a potential to exceed Surface Water Standards at a POC?~~

~~Contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated by the Ash Pits. The erosion pathway can be eliminated because surface soil is largely uncontaminated in the vicinity of the Ash Pits (Table 6 and Figures 2 through 4), and deep erosion is unlikely as discussed in the evaluation presented after Screen 2. However, because groundwater is a possible pathway whereby Woman Creek could become contaminated by the Ash Pits, groundwater chemistry has been evaluated for evidence of contamination. Subsequently, Woman Creek surface water quality is assessed.~~

Downgradient Groundwater Quality

~~Data from wells in the vicinity of the Ash Pits were evaluated to determine whether there is an impact to groundwater. Groundwater quality data are summarized in Table 7, and are discussed with respect to each of the PACs below.~~

~~**SW 133.1 (and SW 133.3)**— One well, 56294, is immediately downgradient of these PACs. No contaminants were detected above RFCA Tier I ALs and only thallium was found above Tier II. Thallium is not a soil contaminant at SW 133.1 (Table 2). It is also not a contaminant at SW 133.3 (see 2001 Annual Update for the HRR).~~

³ The AL is the lowest PRG above Site background levels that was calculated for each of the five selected wildlife receptors judged to be representative of species at RFETS: Preble's meadow jumping mouse and black tailed prairie dog (fossorial [burrowing] small mammals), mourning dove (small ground-feeding bird), terrestrial invertebrate (multiple species), and American kestrel (avian predator). See also footnote 2.

~~SW-133.2—Downgradient of this PAC—aluminum concentrations in groundwater were greater than the RFCA Tier II AL in well 58793, thallium was reported once at a concentration greater than the RFCA Tier II AL in well 63793, and uranium 233,234 and uranium 238 concentrations were greater than RFCA Tier II ALs in wells 58793, 63693, and 63793 downgradient of this PAC—Aluminum and thallium are not soil contaminants at PAC 133.2 (Table 3)—Although uranium 233/234 and uranium 238 have maximum soil concentrations that are well above background, the average concentrations are more than an order of magnitude less, i.e., the significant uranium contamination in the subsurface soil is isolated, and therefore, the PAC does not appear to be a significant source for groundwater uranium contamination—~~

~~SW-133.4 and SW-1702—The nearest downgradient well (63093) contained methylene chloride concentrations above detection limit and uranium 233/234 and uranium 238 concentrations above Tier II ALs—This well was sampled numerous times, and methylene chloride was only detected once—Additionally, methylene chloride is not present in soil at SW-133.4 or SW-1702 (Table 4 and 5)—Like SW-133.2, the maximum concentrations for all three uranium isotopes are well above background in subsurface soil at PAC SW-133.4 (Table 4) and SW-1702 (Table 5), however, the average concentrations are approximately an order of magnitude less—Again, the significant uranium contamination in the subsurface soil at these PACs is isolated, and therefore, the PACs do not appear to be significant sources for groundwater uranium contamination—~~

~~The above assessment indicates that only uranium 233, 234 and uranium 238 are groundwater contaminants that may have arisen from the Ash Pits, specifically PAC SW-133.2, SW-133.4 and SW-1702—More recent data was collected for well 63093 and well 5686 directly downgradient in the Woman Creek drainage (Table 8)—The new uranium data for well 63093 indicates similar uranium concentrations to that of previous data—The concentrations of these uranium isotopes further downgradient in the drainage (5686) are below Tier II ALs, which indicates attenuation (dilution, dispersion, adsorption) has reduced the concentrations to levels of no concern—Indeed, the uranium concentrations in groundwater at all locations downgradient of the Ash Pits are below the surface water standard for Woman Creek of 11 pCi/l of total uranium—~~

Downgradient Surface Water Quality

~~As shown in Table 9, aluminum, antimony, cadmium, copper, iron, lead, manganese, mercury, silver, americium 241, gross alpha, gross beta, and plutonium 239/240 concentrations in nearby surface water locations have occurred at concentrations exceeding the surface water ALs—However, the previous analysis regarding surface soil, subsurface soil, and groundwater contamination strongly suggests that uranium is the only contaminant with potential, albeit low, to migrate to surface water from the Ash Pits via groundwater—Because uranium is not a contaminant that exceeds surface water ALs in Woman Creek, the Ash Pits are not impacting surface water quality—Furthermore, water quality data at downgradient station SW027 (surface water point of evaluation [POE]) and at Pond C-2, indicate these contaminants have never been detected above RFCA surface water ALs—~~

Stewardship Analysis

Application of the Soil Risk Screen to the Ash Pits, specifically Ash Pit 1 (SW-133 1), Ash Pit 2 (SW-133 2), Ash Pit 4 (SW-133 4), and the Recently Identified Ash Pit (TDEM-2) [SW-1702], indicates No Further Action (NFA) is necessary for protection of public health and environment. However, because subsurface soil at some of these PACs has contaminant concentrations that exceed soil ALs, both near-term and long-term stewardship actions have been recommended⁴. They are discussed below.

Near-Term Management Recommendations

Near-term recommendations for environmental stewardship include the following:

- Continued groundwater monitoring to evaluate potential impacts to surface water quality,
- Excavation at the area will continue to be controlled through the Site Soil Disturbance Permit process, and
- Site access and security controls will remain in place pending implementation of long-term controls.

Long-Term Stewardship Recommendations

Based on remaining environmental conditions at the Ash Pits, no specific long-term stewardship activities are recommended beyond the generally applicable Site requirements that may be imposed on this area in the future, which are dependent upon the final remedy selected. Institutional controls that may ~~will~~ be used as appropriate for this area include the following:

- Prohibitions on construction of buildings,
- Restrictions on excavation or other soil disturbance, ~~and~~
- Prohibitions on groundwater pumping in the area of the Ash Pits, ~~and~~
- Monitoring for or prevention of intrusion by burrowing animals

It is also proposed that the groundwater monitoring network in the vicinity of the Ash Pits be evaluated between now and Site closure to determine its adequacy in detecting releases from the Ash Pits. A new well(s) will be added if appropriate. Furthermore, a marker will be placed near the southwestern corner of the western most ash pit ~~Woman Creek downslope from SW-133-6~~ to monitor bank erosion, if any, that may occur. These specific long-term stewardship recommendations will also be summarized in the *Rocky Flats Long Term Stewardship Strategy*. No engineered controls, other environmental monitoring, or physical controls (e.g., fences) are recommended as a result of the conditions remaining at the Ash Pits.

⁴ The Ash Pits are contiguous with the Industrial Area (IA) where subsurface soil contaminant concentrations will likely exceed soil ALs at some locations. Considering the large size of the IA relative to the Ash Pits, there would be no significant reduction in the area requiring near-term and long-term stewardship actions if the contaminated subsurface soil at the Ash Pits were removed.

The Ash Pits will be evaluated as part of the Sitewide Comprehensive Risk Assessment, which is part of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) and Corrective Measures Study/Feasibility Study (CMS/FS) that will be conducted for the Site. The need for and extent of any, more general, long-term stewardship activities will also be analyzed in RFI/RI and CMS/FS and will be proposed as part of the preferred alternative in the Proposed Plan for the Site. Institutional controls and other long-term stewardship requirements for Rocky Flats will ultimately be contained in the Corrective Action Decision/Record of Decision, in any post-closure Colorado Hazardous Waste Act permit that may be required, and in any post-RFCA agreement.

NFAA Summary

Ash Pit 1 (SW-133 1), Ash Pit 2 (SW-133 2), Ash Pit 4 (SW-133 4), and the Recently Identified Ash Pit (TDEM-2) [SW-1702] are proposed for NFAA. The Soil Risk Screen and soil ALs proposed in the RFCA Attachment 5 Modification dated 11/12/02 have been applied to these PACs. The risk screen shows an insignificant potential adverse risk to a wildlife refuge worker because the waste is buried, and the Ash Pits area, although located in a landslide deposit, is in a stable configuration having a gently slope, and a well established vegetative cover to minimize erosion. It is possible a burrowing animal may bring contaminated soil to the surface, however, the incremental risk to the wildlife refuge worker is small because the Ash Pits area is relatively small compared to the exposure unit size for the worker. Although concentrations of lead and beryllium exceed the Preble's meadow Jumping Mouse PRG, particularly in PAC 1702, the mouse typically burrows to a depth of only 15 inches, and there is 3 feet of soil cover on the Ash Pit. Furthermore, the volume of waste and areal extent of PAC 1702 is relatively small, and accordingly, the risk to the Jumping Mouse is also proportionately low. There is little potential for contaminated runoff to impact surface water quality because the waste is buried and covered, the Ash Pits are located far enough from Woman Creek that it is unlikely that ~~to preclude~~ bank erosion would impact the Ash Pits, and they are located outside the 100 year flood plain. Examination of groundwater quality indicates a potential for low level uranium contamination that may have arisen from the Ash Pits, but no impacts from other contaminants. However, uranium is not a contaminant that exceeds surface water ALs in Woman Creek, and therefore, there is no apparent impact to surface water quality from the Ash Pits. Application of the Soil Risk Screen indicates no further accelerated action is required.

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

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DOE 1995, *Geochemical Characterization of Background Surface Soils Background Soils Characterization Program*, Golden, CO, May

DOE, 1996, *Final Phase I RFI/RI Report, Woman Creek Drainage, Operable Unit 5, Vol 1*, Rocky Flats Environmental Technology Site, Golden, CO, April

EPA, CDPHE, 2002 Correspondence to J Legare, DOE RFO, from T Rehder, EPA Region VIII, S Gunderson, CDPHE, RE *Approval of NFA Designation for IHSSs & PACs*, February 14, 2002

Table 1-.Subsurface Soil Sampling Locations for Ash Pits

| IHSS/PAC Number | Borehole/Well Locations |
|------------------------|--|
| 133 1 | 56293, 56393, 56493, 58893 |
| 133 2 | 56993, 57093, 57193, 57293, 57294, 57393, 57493, 59894, |
| 133 4 | 55593, 55693, 55694, 55793, 55893, 55993, 56093, 58093, 58993, 59693, 63093, |
| SW-1702 | 55894, 55994, 56095 |

Table 2 - Summary of Analytical Results for Subsurface Soil at SW-133 1

| Analyte | Samples Above Detection Limit | Maximum Concentration | Unit | Average Concentration | Action Level | Background Concentration |
|-------------------|-------------------------------|-----------------------|-------|-----------------------|--------------|--------------------------|
| Aluminum | 11 | 24300 | mg/kg | 9820.9 | 228000 | 35.7.2 |
| Americium 241 | 9 | 1 | pCi/g | 0.1 | 76 | 0.02 |
| Antimony | 2 | 53 | mg/kg | 26.5 | 409 | 17.0 |
| Arsenic | 11 | 14 | mg/kg | 5.5 | 22.2 | 13.1 |
| Barium | 11 | 374 | mg/kg | 159.7 | 26400 | 289.4 |
| Beryllium | 7 | 4 | mg/kg | 1.4 | 921.8.1* | 14.2 |
| Cadmium | 3 | 57 | mg/kg | 20.7 | 962 | 1.7 |
| Cesium | 11 | 4600 | mg/kg | 7166.4 | | 39.82 |
| Cesium | 1 | 1 | mg/kg | 1.0 | | |
| Chromium | 11 | 41 | mg/kg | 11.5 | 268 | 68 |
| Cobalt | 11 | 37 | mg/kg | 11.0 | 1550 | 29.0 |
| Copper | 11 | 2920 | mg/kg | 298.6 | 40900 | 58.2 |
| Cross Alpha | 12 | 742 | pCi/g | 78.9 | | 43.5 |
| Cross Beta | 12 | 1580 | pCi/g | 171.0 | | 36.8 |
| Iron | 11 | 1100 | mg/kg | 13952.7 | 307000 | 11040.5 |
| Lead | 11 | 260 | mg/kg | 52.2 | 1000.97.7* | 25.0 |
| Lithium | 11 | 8 | mg/kg | 5.0 | 20400 | 34.7 |
| Magnesium | 11 | 4670 | mg/kg | 2595.5 | | 9315.4 |
| Manganese | 11 | 696 | mg/kg | 228.5 | 3480 | 901.6 |
| Mercury | | 0 | mg/kg | 0.0 | 25200 | 1.5 |
| Molybdenum | 1 | 24 | mg/kg | 24.0 | 5110 | 25.6 |
| Nickel | 10 | 66 | mg/kg | 21.3 | 20400 | 62.2 |
| Plutonium 239/240 | 10 | 1 | pCi/g | 0.1 | 50 | 0.02 |
| Potassium | 11 | 1680 | mg/kg | 986.5 | | 6196.8 |
| Selenium | 2 | 0 | mg/kg | 0.0 | 5110 | 4.8 |
| Silver | 3 | 158 | mg/kg | 57.3 | 5110 | 24.5 |
| Sodium | 11 | 741 | mg/kg | 594.7 | | 1251.2 |
| Strontium | 11 | 96 | mg/kg | 52.7 | 613000 | 211.4 |
| Thallium | 2 | 1 | mg/kg | 0.5 | | 1.8 |
| Thm | 1 | 16 | mg/kg | 16.0 | 613000 | 286 |
| Uranium 234 | 12 | 117 | pCi/g | 12.0 | 300 | 2.6 |
| Uranium 235 | 11 | 20 | pCi/g | 2.0 | 8 | 0.12 |
| Uranium 238 | 12 | 1130 | pCi/g | 107.5 | 351 | 1.5 |
| Vanadium | 11 | 58 | mg/kg | 24.4 | 7150 | 88.49 |
| Zinc | 11 | 891 | mg/kg | 136.4 | 307000 | 139.1 |



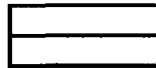
Above Background
Above Action Level

*AL for protection of wildlife refuge worker/AL for protection of ecological receptor

Table 3 - Summary of Analytical Results for Subsurface Soils at SW-133 2

| | Number of Samples above Detection Limit | Maximum | Unit | Average | Action Level | Background |
|---------------------------|---|---------|-------|---------|--------------|------------|
| Aluminum | 0 | 17100 | mg/kg | 11160 | 228000 | 5312 |
| 1,2,4-Trichlorobenzene | 1 | 60 | mg/kg | 60 | 220000 | |
| 1,2-Dichlorobenzene | 1 | 0 | mg/kg | 0 | 31200000 | |
| 1,3-Dichlorobenzene | 1 | 20 | mg/kg | 0 | | |
| 1,4-Dichlorobenzene | 1 | 10 | mg/kg | 10 | 810000 | |
| 2-Chlorophenol | 1 | 10 | mg/kg | 10 | 5110000 | |
| 2-Methylnaphthalene | 1 | 10 | mg/kg | 10 | 20100000 | |
| 4-Chloro-3-Methylphenol | 1 | 10 | mg/kg | 10 | | |
| Americium 241 | 18 | 5 | pCi | 0.3 | 76 | 0.02 |
| Antimony | 3 | 149 | mg/kg | 55.3 | 109 | 16.97 |
| Arsenic | 0 | 8 | mg/kg | | 22 | 1.11 |
| Barium | 20 | 414 | mg/kg | 151.7 | 26100 | 28338 |
| Benzo(a)pyrene | 1 | 10 | mg/kg | 10 | 3120 | |
| Beryllium | 20 | 131 | mg/kg | 16.4 | 921871* | 112 |
| Bis(2-Ethylhexyl)lthalate | 1 | 80 | mg/kg | 80 | 1970000 | |
| Butyl Benzyl lthalate | 1 | 50 | mg/kg | 50 | 117000000 | |
| Cadmium | 6 | 25 | mg/kg | 10.7 | 962 | 1.7 |
| Calcium | 0 | 880 | mg/kg | 560 | | 1082 |
| Chromium | 20 | 8310 | mg/kg | 429.7 | 268 | 683 |
| Cobalt | 20 | 68 | mg/kg | 11.3 | 1550 | 29.01 |
| Copper | 20 | 1360 | mg/kg | 108.0 | 40200 | 3821 |
| Dibenzofuran | 1 | 10 | mg/kg | 10 | 290000 | |
| Diethyl lthalate | 1 | 10 | mg/kg | 10 | 50000000 | |
| Di-n-Butyl Phthalate | 1 | 200 | mg/kg | 200 | 7700000 | |
| Fluoranthene | 1 | 10 | mg/kg | 10 | 2200000 | |
| Cross Alpha | 21 | 191 | pCi/g | 27.2 | | 43.5 |
| Cross Beta | 21 | 662 | pCi/g | 65.8 | | 36.8 |
| Hexachlorobenzene | 1 | 0 | mg/kg | 0 | 1700 | |
| Iron | 0 | 5800 | mg/kg | 200.1 | 30700 | 1101652 |
| Lead | 20 | 878 | mg/kg | 81.7 | 1000977* | 249 |
| Lithium | 1 | 11 | mg/kg | 7.6 | 20100 | 166 |
| Magnesium | 20 | 1150 | mg/kg | 211.0 | | 91511 |
| Manganese | 20 | 160 | mg/kg | 25.1 | 3480 | 90162 |
| Mercury | 1 | 0 | mg/kg | 0.0 | 25200 | 1.52 |
| Molybdenum | 1 | 470 | mg/kg | 151.25 | 5110 | 25.61 |
| Naphthalene | 1 | 0 | mg/kg | 0 | 500000 | |
| Nickel | 20 | 1750 | mg/kg | 254.0 | 20400 | 6221 |
| Phenanthrene | 1 | 0 | mg/kg | 20 | | |
| Phenol | 1 | 0 | mg/kg | 0 | 613000000 | |
| Plutonium 238 | 5 | 10 | pCi/g | 0 | | |
| Plutonium 239/240 | 8 | 1 | pCi/g | 0.3 | 50 | 0.02 |
| Potassium | 12 | 220 | mg/kg | 15.32 | | 61681 |
| Pyrene | 1 | 10 | mg/kg | 10 | 22100000 | |
| Selenium | 1 | 1 | mg/kg | 1.0 | 5110 | 15 |

| | | | | | | |
|-------------|----|------|-------|-------|-----------|---------|
| Silver | 4 | 190 | mg/kg | 65.5 | 5110 | 24.54 |
| Sodium | 18 | 1200 | mg/kg | 274.9 | | 1251.24 |
| Strontium | 20 | 44 | mg/kg | 26.5 | 613000 | 211.38 |
| Thallium | 1 | 0 | mg/kg | 0.0 | | 1.84 |
| Tin | 2 | 56 | mg/kg | 50.0 | 615000 | 286.1 |
| Uranium 234 | 21 | 106 | pCi/g | 8.5 | 300 | 2.6 |
| Uranium 235 | 21 | 38 | pCi/g | 2.0 | 8 | 0.12 |
| Uranium 238 | 22 | 1160 | pCi/g | 58.7 | 351 | 1.5 |
| Vanadium | 20 | 57 | mg/kg | 32.6 | 7150.292* | 88.49 |
| Zinc | 20 | 1290 | mg/kg | 170.4 | 307000 | 139.1 |



Above Background

Above Action Level

*AL for protection of wildlife refuge worker/AL for protection of ecological receptor

Table 4 - Summary of Analytical Results for Subsurface Soils at SW-1334

| Analyte | Number of Samples above Detection Limit | Maximum Concentration | Unit | Average Concentration | Action Level | Background Concentration |
|-------------------|---|-----------------------|-------|-----------------------|--------------|--------------------------|
| Aluminum | 5 | 21200 | mg/kg | 12253.6 | 228000 | 35 / 33 |
| Americium 241 | 29 | 0 | pCi/g | 0.0 | 6 | 0.03 |
| Antimony | 2 | 28 | mg/kg | 16.0 | 409 | 17.0 |
| Arsenic | 5 | 8 | mg/kg | 3.3 | 222 | 1.1 |
| Barium | 35 | 657 | mg/kg | 199.9 | 26400 | 289.4 |
| Beryllium | 22 | 1 | mg/kg | 2.1 | 921.8-1* | 11.2 |
| Cadmium | 13 | 42 | mg/kg | 18.3 | 962 | 1.7 |
| Calcium | 35 | 15100 | mg/kg | 6522.7 | | 39.823 |
| Cesium | 1 | 1 | mg/kg | 17.0 | | |
| Chromium | 58 | 62 | mg/kg | 22.6 | 268 | 68.3 |
| Cobalt | 35 | 54 | mg/kg | 11.5 | 1550 | 29.0 |
| Copper | 35 | 2520 | mg/kg | 609.5 | 40900 | 38.2 |
| Cross Alpha | 13 | 363 | pCi/g | 109.6 | | 43.5 |
| Cross Beta | 37 | 606 | pCi/g | 172.6 | | 36.8 |
| Iron | 35 | 107000 | mg/kg | 29549.1 | 307000 | 41046.5 |
| Lead | 35 | 935 | mg/kg | 149.2 | 1000.977* | 25.0 |
| Lithium | 29 | 18 | mg/kg | 11.0 | 20400 | 1.2 |
| Magnesium | 5 | 5120 | mg/kg | 228.2 | | 9.154 |
| Manganese | 35 | 998 | mg/kg | 326.2 | 3480 | 901.6 |
| Mercury | 11 | 1 | mg/kg | 0.5 | 25200 | 1.5 |
| Molybdenum | 7 | 0 | mg/kg | 13.5 | 5110 | 25.6 |
| Nickel | 55 | 93 | mg/kg | 32.7 | 20400 | 62.2 |
| Plutonium 239/240 | 36 | 1 | pCi/g | 0.1 | 50 | 0.02 |
| Potassium | 30 | 2280 | mg/kg | 1416.1 | | 6196.8 |
| Selenium | 1 | 0 | mg/kg | 0.0 | 5110 | 1.8 |
| Silicon | 3 | 68 | mg/kg | 316.0 | | |
| Silver | 9 | 311 | mg/kg | 81.7 | 5110 | 24.5 |
| Sodium | 34 | 1220 | mg/kg | 648.2 | | 1251.3 |
| Strontium | 35 | 22 | mg/kg | 12.2 | 613000 | 211.1 |
| Thallium | 11 | 0 | mg/kg | 0.0 | | 1.9 |
| Tin | 11 | 579 | mg/kg | 168.0 | 615000 | 286.3 |
| Uranium 234 | 38 | 241 | pCi/g | 50.5 | 300 | 2.6 |
| Uranium 235 | 37 | 17 | pCi/g | 4.5 | 8 | 0.12 |
| Uranium 238 | 38 | 848 | pCi/g | 150.1 | 351 | 1.5 |
| Vanadium | 35 | 60 | mg/kg | 33.0 | 7150 | 88.5 |
| Zinc | 35 | 2390 | mg/kg | 531.2 | 307000 | 139.1 |



Above Background

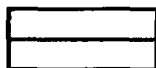
Above Action Level

*AL for protection of wildlife refuge worker/AL for protection of ecological receptor

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Table 5 - Summary of Analytical Results for Subsurface Soils at SW-1702

| Analyte | Number of Samples above Detection Limit | Maximum Concentration | Unit | Average Concentration | Action Level | Background Concentration |
|-------------------|---|-----------------------|-------|-----------------------|--------------|--------------------------|
| Aluminum | 9 | 28600 | mg/kg | 17514.4 | 228000 | 35373.1 |
| Americium 241 | 10 | 3 | pCi/g | 0.3 | 76 | 0.02 |
| Antimony | 2 | 16 | mg/kg | 11.5 | 409 | 17.0 |
| Arsenic | 9 | 21 | mg/kg | 10.0 | 22.2 | 13.1 |
| Barium | 9 | 1680 | mg/kg | 509.7 | 26400 | 289.4 |
| Beryllium | 9 | 446 | mg/kg | 91.4 | 9218.71* | 14.2 |
| Cadmium | 7 | 71 | mg/kg | 27.0 | 962 | 1.7 |
| Calcium | 9 | 24700 | mg/kg | 8977.8 | | 39382.3 |
| Cesium | 6 | 9 | mg/kg | 6.2 | | |
| Chromium | 2 | 4.4 | mg/kg | 91.6 | 68 | 68.3 |
| Cobalt | 2 | 701 | mg/kg | 118.6 | 1550 | 2.00 |
| Copper | 2 | 8850 | mg/kg | 681 | 10000 | 8 |
| Cross Alpha | 1 | 41 | pCi/g | 116.4 | | 1.5 |
| Cross Beta | 11 | 872 | pCi/g | 276 | | 6.5 |
| Iron | 2 | 10000 | mg/kg | 10000.0 | 07000 | 11046 |
| Lead | 9 | 200 | mg/kg | 123.4 | 1000.97 | 5.0 |
| Lithium | 9 | 14 | mg/kg | 10.6 | 20400 | 34.7 |
| Magnesium | 9 | 11700 | mg/kg | 4656.7 | | 9315.4 |
| Manganese | 9 | 2150 | mg/kg | 588.6 | 3480 | 901.6 |
| Mercury | | 0 | mg/kg | 0.0 | 25200 | 1.5 |
| Molybdenum | 5 | 68 | mg/kg | 34.4 | 5110 | 25.6 |
| Nickel | 9 | 325 | mg/kg | 94.1 | 20400 | 62.2 |
| Plutonium 238 | 7 | 0 | pCi/g | 0.0 | | |
| Plutonium 239/240 | 9 | 7 | pCi/g | 1.6 | 50 | 0.02 |
| Potassium | 9 | 3950 | mg/kg | 1734.0 | | 6196.8 |
| Selenium | 3 | 7 | mg/kg | 5.3 | 5110 | 4.8 |
| Silicon | 5 | 704 | mg/kg | 503.0 | | |
| Silver | 8 | 209 | mg/kg | 74.5 | 5110 | 24.5 |
| Sodium | 9 | 3360 | mg/kg | 1254.1 | | 1251.2 |
| Strontium | 9 | 102 | mg/kg | 54.1 | 61000 | 211.4 |
| Thallium | 5 | 7 | mg/kg | 3.4 | | 1.8 |
| Tin | 7 | 102 | mg/kg | 49.6 | 613000 | 286.3 |
| Uranium 234 | 11 | 550 | pCi/g | 6.8 | 300 | 2.6 |
| Uranium 235 | 11 | 65 | pCi/g | 2.7 | 8 | 0.1 |
| Uranium 238 | 11 | 94 | pCi/g | 177.0 | 51 | 1.5 |
| Vanadium | 9 | 60 | mg/kg | 36.2 | 7150 | 88.5 |
| Zinc | 9 | 7220 | mg/kg | 1802.6 | 30700 | 139.1 |



Above Background

Above Action Level

*AL for protection of wildlife refuge worker/AL for protection of ecological receptor

**Table 6 - Summary of Analytical Results for Surface Soils and Sediments from the
Ash Pits**

| Analyte | Number of Samples above Detection Limits | Maximum Concentration | Unit | Average Concentration | Action Level | Background Concentration |
|-----------------------------|--|--------------------------|-------|--------------------------|--------------|-----------------------------|
| Surface Soil Samples | | | | | | |
| Arsenic | 20 | 7.7 | mg/kg | 5.3 | 22.2 | 13.1 |
| Beryllium | 8 | 1.6 | mg/kg | 1.2 | 921/8.71 | 14.2 |
| Sediment Samples | | | | | | |
| Arsenic | 17 | 17.3 | mg/kg | 3.7 | 22.2 | 13.1 |
| Beryllium | 10 | 6.8 | mg/kg | 1.6 | 921/8.71 | 14.2 |

**Table 7 - Summary of Analytical Results Above Tier II Action Levels for
Groundwater at the Ash Pits**

| Location | Collection Date | Description | Result | Units | Above Tier I | Above Tier II | Tier I | Tier II |
|--------------------------------|-----------------|--------------------|---------|-------|--------------|---------------|----------|----------|
| IISSs 133 1 and 133 3 | | | | | | | | |
| 56294 | 4/27/95 | Thallium | 5.9 | ug/L | No | Yes | 200 | 2 |
| IISS 133 2 | | | | | | | | |
| 58793 | 3/7/95 | | 44900.0 | ug/L | No | Yes | 3.65E+06 | 3.65E+04 |
| 58793 | 8/12/93 | Aluminum | 64200.0 | ug/L | No | Yes | 3.65E+06 | 3.65E+04 |
| 63793 | 5/1/95 | Thallium | 4.3 | ug/L | No | Yes | 200 | 2 |
| 63693 | 1/18/95 | Uranium 233, 234 | 1.3 | pCi/L | No | Yes | 106 | 1.06 |
| 63793 | 1/4/95 | Uranium 233, 234 | 1.4 | pCi/L | No | Yes | 106 | 1.06 |
| 63793 | 5/1/95 | Uranium 233, 234 | 4.1 | pCi/L | No | Yes | 106 | 1.06 |
| 58793 | 8/12/93 | Uranium 238 | 0.8 | pCi/L | No | Yes | 76.8 | 0.768 |
| 58793 | 6/18/93 | Uranium 238 | 1.1 | pCi/L | No | Yes | 76.8 | 0.768 |
| 58793 | 1/6/95 | Uranium 238 | 3.6 | pCi/L | No | Yes | 76.8 | 0.768 |
| 63693 | 1/18/95 | Uranium 238 | 1.3 | pCi/L | No | Yes | 76.8 | 0.768 |
| 63793 | 1/4/95 | Uranium 238 | 1.1 | pCi/L | No | Yes | 76.8 | 0.768 |
| 63793 | 5/1/95 | Uranium 238 | 2.9 | pCi/L | No | Yes | 76.8 | 0.768 |
| IISSs 133 4 and SW 1702 | | | | | | | | |
| 63093 | 3/30/94 | Methylene Chloride | 13.0 | ug/L | No | Yes | 500 | 5 |
| 63093 | 5/24/95 | Uranium 233, 234 | 3.3 | pCi/L | No | Yes | 106 | 1.06 |
| 63093 | 5/24/95 | Uranium 238 | 2.4 | pCi/L | No | Yes | 76.8 | 0.768 |

Table 8 - Uranium Concentrations in Groundwater Downgradient of SW-133 4 and SW-1702 (August 2001)

| Analyte | Result | Unit | Minimum Detection Activity | ICR I Action Level | ICR II Action Level |
|-------------------|--------|-------|----------------------------|--------------------|---------------------|
| Well 5686 | | | | | |
| Uranium 233 234 | 0.65 | pCi/L | 0.046 | 106 | 106 |
| Uranium 235 | U | pCi/L | 0.060 | 135 | 24 |
| Uranium 238 | 0.53 | pCi/L | 0.046 | 586 | 103 |
| Well 63093 | | | | | |
| Uranium 233 234 | 2.58 | pCi/L | 0.068 | 106 | 106 |
| Uranium 235 | 0.093 | pCi/L | 0.048 | 135 | 24 |
| Uranium 238 | 1.92 | pCi/L | 0.014 | 586 | 103 |

Table 9 – Analytes Detected Above Action Levels in Surface Water Near the Ash Pits

| Location | Collection Date | Description | Result | Units | Standard |
|---------------|-----------------|-------------|--------|-------|----------|
| Metals | | | | | |
| SW041 | 8/6/90 | Aluminum | 90.6 | ug/L | 87 |
| SW041 | 8/6/90 | Aluminum | 99.1 | ug/L | 87 |
| SW039 | 4/12/90 | Aluminum | 238 | ug/L | 87 |
| SW041 | 4/5/90 | Aluminum | 631 | ug/L | 87 |
| SW040 | 7/30/87 | Aluminum | 2500 | ug/L | 87 |
| SW041 | 9/5/90 | Antimony | 11.4 | ug/L | 6 |
| SW039 | 11/8/90 | Antimony | 14.7 | ug/L | 6 |
| SW039 | 9/13/90 | Antimony | 22.4 | ug/L | 6 |
| SW041 | 7/8/91 | Antimony | 29 | ug/L | 6 |
| SW039 | 9/13/90 | Antimony | 14.4 | ug/L | 6 |
| SW039 | 11/8/90 | Antimony | 15.6 | ug/L | 6 |
| SW041 | 6/4/91 | Cadmium | 1.9 | ug/L | 1.5 |
| SW041 | 7/8/91 | Cadmium | 2 | ug/L | 1.5 |
| SW039 | 6/4/91 | Copper | 16 | ug/L | 16 |
| SW041 | 6/4/91 | Copper | 28 | ug/L | 16 |
| SW041 | 8/5/91 | Iron | 1010 | ug/L | 1000 |
| SW041 | 9/5/91 | Iron | 1100 | ug/L | 1000 |
| SW041 | 4/5/90 | Iron | 1320 | ug/L | 1000 |
| SW041 | 12/4/90 | Iron | 13900 | ug/L | 1000 |
| SW041 | 12/4/90 | Iron | 13900 | ug/L | 1000 |
| SW041 | 11/20/89 | Iron | 15900 | ug/L | 1000 |
| SW041 | 2/6/90 | Iron | 1970 | ug/L | 1000 |
| SW041 | 6/16/89 | Iron | 2090 | ug/L | 1000 |
| SW041 | 5/3/91 | Iron | 2670 | ug/L | 1000 |
| SW041 | 5/3/91 | Iron | 2670 | ug/L | 1000 |
| SW041 | 2/6/90 | Iron | 3550 | ug/L | 1000 |
| SW039 | 12/4/90 | Iron | 5390 | ug/L | 1000 |
| SW039 | 12/4/90 | Iron | 5390 | ug/L | 1000 |
| SW041 | 5/26/89 | Iron | 5480 | ug/L | 1000 |
| SW041 | 6/4/90 | Iron | 6800 | ug/L | 1000 |
| SW041 | 12/5/89 | Iron | 8180 | ug/L | 1000 |
| SW039 | 11/18/91 | Lead | 8 | ug/L | 6.5 |
| SW039 | 12/20/89 | Lead | 7.3 | ug/L | 6.5 |
| SW041 | 12/5/89 | Lead | 6.6 | ug/L | 6.5 |
| SW041 | 12/4/90 | Manganese | 1100 | ug/L | 1000 |
| SW041 | 12/4/90 | Manganese | 1100 | ug/L | 1000 |

**Table 9 - Analytes Detected Above Action Levels in Surface Water Near the Ash Pits
(cont)**

| Location | Collection Date | Description | Result | Units | Standard |
|----------------------|-----------------|-------------------|--------|-------|----------|
| SW039 | 11/17/89 | Mercury | 0.33 | ug/L | 0.01 |
| SW041 | 5/26/89 | Mercury | 0.44 | ug/L | 0.01 |
| SW039 | 4/6/89 | Mercury | 0.3 | ug/L | 0.01 |
| SW041 | 3/1/89 | Mercury | 1.1 | ug/L | 0.01 |
| SW039 | 3/21/90 | Mercury | 0.25 | ug/L | 0.01 |
| SW039 | 4/12/90 | Mercury | 0.3 | ug/L | 0.01 |
| SW039 | 11/17/89 | Mercury | 0.33 | ug/L | 0.01 |
| SW039 | 4/15/92 | Silver | 2.7 | ug/L | 0.6 |
| SW041 | 12/4/90 | Silver | 3.4 | ug/L | 0.6 |
| SW041 | 12/4/90 | Silver | 3.4 | ug/L | 0.6 |
| SW041 | 9/5/90 | Silver | 3.5 | ug/L | 0.6 |
| SW041 | 11/5/90 | Silver | 9.8 | ug/L | 0.6 |
| SW041 | 7/8/91 | Silver | 3 | ug/L | 0.6 |
| SW041 | 11/5/90 | Silver | 9.8 | ug/L | 0.6 |
| Radionuclides | | | | | |
| SW039 | 1/17/90 | Americium 241 | 0.162 | pCi/L | 0.15 |
| SW039 | 1/17/90 | Americium 241 | 0.162 | pCi/L | 0.15 |
| SW041 | 6/4/90 | Gross Alpha | 40.1 | pCi/L | 7 |
| SW041 | 6/16/89 | Gross Alpha | 57 | pCi/L | 7 |
| SW041 | 1/4/90 | Gross Alpha | 8.3 | pCi/L | 7 |
| SW041 | 1/4/90 | Gross Alpha | 8.3 | pCi/L | 7 |
| SW039 | 7/16/90 | Gross Beta | 23.69 | pCi/L | 8 |
| SW041 | 1/4/90 | Gross Beta | 14.9 | pCi/L | 8 |
| SW041 | 6/4/90 | Gross Beta | 36 | pCi/L | 8 |
| SW041 | 6/16/89 | Gross Beta | 41 | pCi/L | 8 |
| SW039 | 6/27/88 | Plutonium 239/240 | 0.219 | pCi/L | 0.15 |

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23